

107/102-103R

**CLAIMS**

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2  
3 1. In a computer system, a method comprising dynamically generating a  
4 schema to represent multiple hierarchies of inter-object relationships between a  
5 plurality of objects in a data polyarchy, the schema being generated based on  
6 values of attributes of the objects.

7  
8 2. A method as recited in claim 1, wherein the inter-object relationships  
9 comprise a flat relationship, a hierarchical relationship, and multiple intersecting  
10 hierarchies of relationships.

11  
12 3. A method as recited in claim 1, where the objects comprise enterprise  
13 resource planning (ERP) objects, directory based objects, or database objects.

14  
15 4. A method as recited in claim 1, wherein generating the schema  
16 further comprises:

17 identifying a plurality of attributes of interest based on values of attributes  
18 of the objects;

19 identifying one or more dimensions of inter-object relationships within  
20 which objects that comprise at least a subset of the attributes of interest participate.

21  
22 5. A method as recited in claim 1, wherein the schema is designed to  
23 provide access control to organizational resources.

6. A method as recited in claim 1, further comprising communicating the schema to a client, the schema identifying how the client can access objects in the data polyarchy.

7. A method as recited in claim 1, further comprising:  
 receiving a request from a client based on the schema; and  
 responsive to receiving the request:  
     accessing an object of the objects based on the request;  
     transforming the object into transformed data that expresses any inter-object relationship between the object and any other object of the objects based on the request; and  
     issuing the transformed data to the client.

8. A method as recited in claim 7, wherein the transformed data expresses the inter-object relationships with respect to other objects in a same dimension or other objects in a different dimension, the same and/or the different dimension being indicated by the request.

9. A method as recited in claim 7, wherein the request comprises a limiting attribute to limit the transformed data by presenting the one or more objects only with respect to the limiting attribute.

1       **10.**   A method as recited in claim 7, wherein the request queries for  
2 information corresponding to an object in the data polyarchy with respect to one or  
3 more particular dimensions.

4  
5       **11.**   A method as recited in claim 7, wherein the request comprises a  
6 dimension indicator to specify one or more hierarchies within which the data is to  
7 be presented in the transformed data.

8  
9       **12.**   A method as recited in claim 7, wherein the request further  
10 comprises a distinguishing attribute, a classifying attribute, or a locating attribute.

11  
12       **13.**   A method as recited in claim 7, wherein the request comprises a  
13 dimension information modifier to specify a particular direction and a particular  
14 depth to retrieve information from the data polyarchy.

15  
16       **14.**   A method as recited in claim 13, wherein the dimension information  
17 modifier is a siblings indication to retrieve all objects with a same parent as a  
18 current object in the data polyarchy.

19  
20       **15.**   A method as recited in claim 7, wherein the request indicates that at  
21 least one subset of the objects comprise a similar attribute; and wherein accessing  
22 one or more objects further comprises:

23       retrieving the one or more objects in a manner that is independent of any  
24 hierarchical data relationship between the data objects in the at least one subset.  
25

1        16. A method as recited in claim 15, wherein the similar attribute  
2 comprises a logical domain selected from a distinguishing domain, a locating  
3 domain or a classifying domain.

4  
5        17. A method as recited in claim 7, wherein the request corresponds to  
6 at least a first and second subset of the objects, the request comprising a logical  
7 modifier that specifies an operation, and wherein the method further comprises:

8        responsive to receiving the request, identifying at least a portion of the first  
9 and second subsets of directory objects in the polyarchical data set; and

10       wherein transforming the one or more objects further comprises performing  
11 the operation on the first and second subsets.

12  
13       18. A method as recited in claim 17, wherein the logical modifier is a  
14 Boolean modifier.

15  
16       19. A method as recited in claim 17, wherein the operation comprises  
17 any combination of filtering, union, intersection, join, and/or exclusion operations.

18  
19       20. A method as recited in claim 7, wherein accessing the object further  
20 comprises accessing the object in a manner that is independent of any inter-object  
21 relationship between the object and any other object of the objects in a manner that  
22 is independent of any definition of a hierarchy in the data polyarchy.

1           **21.**   A method as recited in claim 7, wherein accessing the object further  
2 comprises querying the data polyarchy for the object.

3  
4           **22.**   A method as recited in claim 7, wherein accessing the object further  
5 comprises managing, manipulating, or modifying the object or a relationship  
6 between the object and one of more of the other objects.

7  
8           **23.**   A computer-readable medium having computer-executable  
9 instructions comprising instructions for:

10           dynamically generating a schema to represent multiple hierarchies of inter-  
11 object relationships between a plurality of objects in a data polyarchy, the schema  
12 being generated based on values of attributes of the objects, the schema indicating  
13 each attribute of interest in the data polyarchy, the schema further indicating any  
14 of one or more dimensions of inter-object relationships within which objects that  
15 comprise at least a subset of the attributes of interest participate.

16  
17           **24.**   A computer-readable medium as recited in claim 23, wherein the  
18 inter-object relationships comprise a flat relationship, a hierarchical relationship,  
19 and multiple intersecting hierarchies of relationships.

20  
21           **25.**   A computer-readable medium as recited in claim 23, where the  
22 objects comprise enterprise resource planning (ERP) objects, directory based  
23 objects, or database objects.

1       26. A computer-readable medium as recited in claim 23, further  
2 comprising computer-executable instructions for communicating the schema to a  
3 client to indicate how the client is to interface with the objects in the data  
4 polyarchy.

5  
6       27. A computer-readable medium as recited in claim 23, further  
7 comprising computer-executable instructions for:

8       receiving a request from a client based on the schema;

9       responsive to receiving the request:

10       accessing at least one object in the data polyarchy based on the  
11 request;

12       transforming the at least one object into transformed data that  
13 expresses any inter-object relationship between the at least one object and any  
14 other objects of the objects based on the request; and

15       issuing the transformed data to the client.

16  
17       28. A computer-readable medium as recited in claim 27, wherein the  
18 transformed data expresses the inter-object relationships with respect to other  
19 objects in a same dimension or other objects in a different dimension, the same  
20 and/or the different dimension being indicated by the request.

21  
22       29. A computer-readable medium as recited in claim 27, wherein the  
23 request comprises a limiting attribute to limit the transformed data by presenting  
24 the one or more objects only with respect to the limiting attribute.  
25

1       **30.**    A computer-readable medium as recited in claim 27, wherein the  
2 request queries for information corresponding to an object in the data polyarchy  
3 with respect to one or more particular dimensions.

4  
5       **31.**    A computer-readable medium as recited in claim 27, wherein the  
6 request comprises a dimension indicator to specify one or more hierarchies within  
7 which the data is to be presented in the transformed data.

8  
9       **32.**    A computer-readable medium as recited in claim 27, wherein the  
10 request further comprises a distinguishing attribute, a classifying attribute, or a  
11 locating attribute.

12  
13       **33.**    A computer-readable medium as recited in claim 27, wherein the  
14 request comprises a dimension information modifier to specify a particular  
15 direction and a particular depth to retrieve information from the data polyarchy.

16  
17       **34.**    A computer-readable medium as recited in claim 33, wherein the  
18 dimension information modifier is a siblings indication to retrieve all objects with  
19 a same parent as a current object in the data polyarchy.

1           **35.**    A computer-readable medium as recited in claim 27 wherein the  
2 request indicates that at least one subset of the objects comprise a similar attribute;  
3 and wherein the computer-executable instructions for accessing one or more  
4 objects further comprise instructions for:

5                retrieving the one or more objects in a manner that is independent of any  
6 hierarchical data relationship between the data objects in the at least one subset.

7  
8           **36.**    A computer-readable medium as recited in claim 35, wherein the  
9 similar attribute comprises a logical domain selected from a distinguishing  
10 domain, a locating domain or a classifying domain.

11  
12           **37.**    A computer-readable medium as recited in claim 27, wherein the  
13 request corresponds to at least a first and second subset of the objects, the request  
14 comprising a logical modifier that specifies an operation, and wherein the  
15 computer-executable instructions further comprise instructions for:

16                responsive to receiving the request, identifying at least a portion of the first  
17 and second subsets of directory objects in the polyarchical data set; and

18                wherein transforming the one or more objects further comprises performing  
19 the operation on the first and second subsets.

20  
21           **38.**    A computer-readable medium as recited in claim 37, wherein the  
22 logical modifier is a Boolean modifier.



1       **39.**    A computer-readable medium as recited in claim 37, wherein the  
2 operation comprises any combination of filtering, union, intersection, join, and/or  
3 exclusion operations.

4  
5       **40.**    A computer-readable medium as recited in claim 27, wherein  
6 accessing the at least one object further comprises accessing the at least one object  
7 in a manner that is independent of any inter-object relationship between the at least  
8 one object and any other object of the objects in a manner that is independent of  
9 any definition of a hierarchy in the data polyarchy.

10  
11       **41.**    A computer-readable medium as recited in claim 27, wherein  
12 accessing the at least one object further comprises querying the data polyarchy for  
13 the at least one object.

14  
15       **42.**    A computer-readable medium as recited in claim 27, wherein  
16 accessing the at least one object further comprises managing, manipulating, or  
17 modifying the at least one object or a relationship between the at least one object  
18 and one of more different objects of the objects.

19  
20       **43.**    A computer comprising:  
21       a memory comprising the computer-executable instructions; and  
22       a processor coupled to the memory, the processor being configured to fetch  
23 and execute the computer-executable instructions for:  
24       dynamically generating a schema to represent multiple hierarchies of  
25 inter-object relationships between a plurality of objects in a data polyarchy, the

1 schema being generated based on values of attributes of the objects, the schema  
2 indicating each attribute of interest in the data polyarchy, the schema further  
3 indicating any of one or more dimensions of inter-object relationships within  
4 which objects that comprise at least a subset of the attributes of interest participate.

5  
6 **44.** A computer as recited in claim 43, wherein the inter-object  
7 relationships comprise a flat relationship, a hierarchical relationship, and multiple  
8 intersecting hierarchies of relationships.

9  
10 **45.** A computer as recited in claim 43, where the objects comprise  
11 enterprise resource planning (ERP) objects, directory based objects, or database  
12 objects.

13  
14 **46.** A computer as recited in claim 43, wherein the computer-executable  
15 instructions further comprise instructions for communicating the schema to a  
16 client to indicate how the client is to interface with the objects in the data  
17 polyarchy.

1       **47.**    A computer as recited in claim 43, wherein the computer-executable  
2 instructions further comprise instructions for:  
3       receiving a request from a client based on the schema;  
4       responsive to receiving the request:  
5           accessing one or more objects in the data polyarchy based on the  
6 request;  
7           transforming the one or more of the objects into transformed data  
8 that expresses any inter-object relationships based on the request; and  
9       issuing the transformed data to the client.

10  
11       **48.**    A computer as recited in claim 47, wherein the transformed data  
12 expresses the inter-object relationships with respect to other objects in a same  
13 dimension or other objects in a different dimension, the same and/or the different  
14 dimension being indicated by the request.

15  
16       **49.**    A computer as recited in claim 47, wherein the request comprises a  
17 limiting attribute to limit the transformed data by presenting the one or more  
18 objects only with respect to the limiting attribute.

19  
20       **50.**    A computer as recited in claim 47, wherein the request queries for  
21 information corresponding to an object in the data polyarchy with respect to one or  
22 more particular dimensions.  
23  
24  
25

1       **51.**    A computer as recited in claim 47, wherein the request comprises a  
2 dimension indicator to specify one or more hierarchies within which the data is to  
3 be presented in the transformed data.

4  
5       **52.**    A computer as recited in claim 47, wherein the request further  
6 comprises a distinguishing attribute, a classifying attribute, or a locating attribute.

7  
8       **53.**    A computer as recited in claim 47, wherein the request comprises a  
9 dimension information modifier to specify a particular direction and a particular  
10 depth to retrieve information from the data polyarchy.

11  
12       **54.**    A computer as recited in claim 53, wherein the dimension  
13 information modifier is a siblings indication to retrieve all objects with a same  
14 parent as a current object in the data polyarchy.

15  
16       **55.**    A computer as recited in claim 47, wherein the request indicates that  
17 at least one subset of the objects comprise a similar attribute; and wherein the  
18 computer-executable instructions for accessing one or more objects further  
19 comprise instructions for:

20       retrieving the one or more objects in a manner that is independent of any  
21 hierarchical data relationship between the data objects in the at least one subset.

1        56. A computer as recited in claim 55, wherein the similar attribute  
2 comprises a logical domain selected from a distinguishing domain, a locating  
3 domain or a classifying domain.

4  
5        57. A computer as recited in claim 47, wherein the request corresponds  
6 to at least a first and second subset of the objects, the request comprising a logical  
7 modifier that specifies an operation, and wherein the computer-executable  
8 instructions further comprise instructions for:

9        responsive to receiving the request, identifying at least a portion of the first  
10 and second subsets of directory objects in the polyarchical data set; and

11        wherein transforming the one or more objects further comprises performing  
12 the operation on the first and second subsets.

13  
14        58. A computer as recited in claim 57, wherein the logical modifier is a  
15 Boolean modifier.

16  
17        59. A computer as recited in claim 57, wherein the operation comprises  
18 any combination of filtering, union, intersection, join, and/or exclusion operations.

19  
20        60. A computer as recited in claim 47, wherein accessing the one or  
21 more objects further comprises accessing the one or more objects in a manner that  
22 is independent of any inter-object relationship between the one or more objects  
23 and any other object of the objects in a manner that is independent of any  
24 definition of a hierarchy in the data polyarchy.

1        61. A computer as recited in claim 47, wherein accessing the one or  
2 more objects further comprises querying the data polyarchy for the one or more  
3 objects.

4  
5        62. A computer as recited in claim 47, wherein accessing the one or  
6 more objects further comprises managing, manipulating, or modifying the one or  
7 more objects or a relationship between an object of the one or more objects and  
8 one of more different objects of the objects.

9  
10       63. A computer comprising:  
11       processing means for dynamically generating a schema to represent  
12 multiple hierarchies of inter-object relationships between a plurality of objects in a  
13 data polyarchy, the schema being generated based on values of attributes of the  
14 objects, the schema indicating each attribute of interest in the data polyarchy, the  
15 schema further indicating any of one or more dimensions of inter-object  
16 relationships within which objects that comprise at least a subset of the attributes  
17 of interest participate.

18  
19       64. A computer as recited in claim 63, wherein the inter-object  
20 relationships comprise a flat relationship, a hierarchical relationship, and multiple  
21 intersecting hierarchies of relationships.

1       **65.**   A computer as recited in claim 63, where the objects comprise  
2 enterprise resource planning (ERP) objects, directory based objects, or database  
3 objects.

4  
5       **66.**   A computer as recited in claim 63, further comprising processing  
6 means for communicating the schema to a client to indicate how the client is to  
7 interface with the objects in the data polyarchy.

8  
9       **67.**   A computer as recited in claim 63, further comprising processing  
10 means for:

11       receiving a request from a client based on the schema;

12       responsive to receiving the request:

13           accessing one or more objects in the data polyarchy based on the  
14 request;

15           transforming the one or more of the objects into transformed data  
16 that expresses any inter-object relationships based on the request; and

17           issuing the transformed data to the client.

18  
19       **68.**   A computer as recited in claim 67, wherein the transformed data  
20 expresses the inter-object relationships with respect to other objects in a same  
21 dimension or other objects in a different dimension, the same and/or the different  
22 dimension being indicated by the request.

1       **69.**    A computer as recited in claim 67, wherein the request comprises a  
2 limiting attribute to limit the transformed data by presenting the one or more  
3 objects only with respect to the limiting attribute.

4  
5       **70.**    A computer as recited in claim 67, wherein the request queries for  
6 information corresponding to an object in the data polyarchy with respect to one or  
7 more particular dimensions.

8  
9       **71.**    A computer as recited in claim 67, wherein the request comprises a  
10 dimension indicator to specify one or more hierarchies within which the data is to  
11 be presented in the transformed data.

12  
13       **72.**    A computer as recited in claim 67, wherein the request further  
14 comprises a distinguishing attribute, a classifying attribute, or a locating attribute.

15  
16       **73.**    A computer as recited in claim 67, wherein the request comprises a  
17 dimension information modifier to specify a particular direction and a particular  
18 depth to retrieve information from the data polyarchy.

19  
20       **74.**    A computer as recited in claim 73, wherein the dimension  
21 information modifier is a siblings indication to retrieve all objects with a same  
22 parent as a current object in the data polyarchy.



1       75.    A computer as recited in claim 67, wherein the request indicates that  
2 at least one subset of the objects comprise a similar attribute; and wherein the  
3 means for accessing one or more objects further comprise means for:

4       retrieving the one or more objects in a manner that is independent of any  
5 hierarchical data relationship between the data objects in the at least one subset.  
6

7       76.    A computer as recited in claim 75, wherein the similar attribute  
8 comprises a logical domain selected from a distinguishing domain, a locating  
9 domain or a classifying domain.  
10

11       77.    A computer as recited in claim 67, wherein the request corresponds  
12 to at least a first and second subset of the objects, the request comprising a logical  
13 modifier that specifies an operation, and wherein the processing means further  
14 comprise means for:

15       responsive to receiving the request, identifying at least a portion of the first  
16 and second subsets of directory objects in the polyarchical data set; and

17       wherein transforming the one or more objects further comprises performing  
18 the operation on the first and second subsets.  
19

20       78.    A computer as recited in claim 77, wherein the logical modifier is a  
21 Boolean modifier.  
22

23       79.    A computer as recited in claim 77, wherein the operation comprises  
24 any combination of filtering, union, intersection, join, and/or exclusion operations.  
25

1       **80.**     A computer as recited in claim 67, wherein the means for accessing  
2 the one or more objects further comprises means for accessing the one or more  
3 objects in a manner that is independent of any inter-object relationship between  
4 the one or more objects and any other object of the objects in a manner that is  
5 independent of any definition of a hierarchy in the data polyarchy.

6  
7       **81.**     A computer as recited in claim 67, wherein the means for accessing  
8 the one or more objects further comprises querying the data polyarchy for the one  
9 or more objects.

10  
11       **82.**     A computer as recited in claim 67, wherein the means for accessing  
12 the one or more objects further comprises means for managing, manipulating, or  
13 modifying the one or more objects or a relationship between an object of the one  
14 or more objects and one of more different objects of the objects.

15  
16       **83.**     A polyarchical query language data structure comprising:  
17       a first data field to specify a particular schema, the particular schema  
18 indicating how to meaningfully present or manage a plurality of objects in a data  
19 polyarchy based on values of attributes in the objects; and  
20       a second data field to indicate an attribute of interest; and  
21       a third data field to indicate how one or more objects comprising the  
22 attribute of interest are to be presented or managed with respect to one or more  
23 participating dimensions of inter-object relationships which are based on the  
24 schema.  
25

1       **84.**    A polyarchical query language data structure as recited in claim 83  
2 further comprising a fourth data field to indicate a physical access strategy with  
3 respect to the data polyarchy, the physical access strategy being identified by  
4 indicating that the attribute of interest belongs to a distinguishing domain, a  
5 classifying domain, or a locating domain.

6  
7       **85.**    A polyarchical query language data structure as recited in claim 83,  
8 wherein the third data field further comprises a modifier to limit the one or more  
9 objects.

10  
11       **86.**    A polyarchical query language data structure as recited in claim 83,  
12 wherein the third data field further comprises a logical modifier to limit the one or  
13 more objects.

14  
15       **87.**    A polyarchical query language data structure as recited in claim 83,  
16 wherein the third data field further comprises a dimension information indicator  
17 for specifying a dimension within which to present the one or more objects.

18  
19       **88.**    A polyarchical query language data structure as recited in claim 83,  
20 wherein the third data field further comprises a dimension information indicator  
21 for specifying a particular direction and a particular depth within which to present  
22 a data relationship between a complex object of the one or more objects and one or  
23 more different objects of the one or more objects.

1        89.    A polyarchical query language data structure as recited in claim 83,  
2 wherein each data field is expressed in an XML data format.

3  
4        90.    A polyarchical query language data structure as recited in claim 83,  
5 wherein the particular schema provides access to only a first subset of the objects  
6 to provide access control to the objects.

7  
8        91.    A computer-readable medium comprising a polyarchical query  
9 language data structure as recited in claim 83.